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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF
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TECHNICAL STUDIES ON NORTH AMERICAN PLANTS

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(Continued from page 60)

× *SOLIDAGO* (§ *EUTHAMIA*) **hirtipes**, hybr. nov. (? *S. graminifolia* (L.) Salisb., var. *Nuttallii* (Greene) Fernald × *S. microcephala* (Greene) Bush). TAB. 1011. Planta robusta ad 1.5 m. alta; foliis lineari-lanceolatis divergentibus 3–5-nerviis utrinque scabro-puberulis, in axillis plus minusve fasciculatis; foliis primariis 4–6 mm. latis; corymbo ad 4.5 dm. lato ramis valde adscendentibus, ramulis ultimis densissime griseo-hirtellis; capitulis glomerulatis vel solitariis pedicellatisque; involucrio glutinoso pallido cylindrico (sicco cylindrico-turbinato) 3–4 mm. longo; phyllariis pallide stramineis apice adpresso viride.—Sussex Co., VIRGINIA: roadside thicket about 1½ miles north of Waverly, Sept. 13, 1945, *Fernald & Long*, no. 15,015 (TYPE in Herb. Gray; ISOTYPE in Herb. Phil. Acad.).

× *Solidago hirtipes* is a very puzzling plant, which may prove to be a fully established species. In its very broad and flat-topped corymb (with inclination to form “stories” at different heights) and in its very slender heads it at once suggests the common southern *S. microcephala* (PLATE 1012, FIGS. 4–6); but that characteristic species has the very narrow and often longitudinally folded primary leaves only 1–2 mm. broad, 1-nerved (only rarely with any trace of lateral nerves), and subtending abundant suppressed axillary branches. Its sparsely hirtellous pedicels are mostly 1-headed; while its very narrow leaves are as gray-puberulent as in × *S. hirtipes*. In its great stature, broad

3-5-nerved leaves and strong tendency to glomerulate heads the new plant is as near *S. graminifolia*, var. *Nuttallii*. In that plant (PLATE 1012, FIGS. 1-3), however, the suppressed axillary branches are few or wanting, the leaves less puberulent, the pubescence of the lower side usually confined to the ribs, the corymb with convex-topped secondary corymbs, the branchlets and pedicels as hirtellous as in \times *S. hirtipes* (or even more so) but ending in densely crowded glomerules of broader and more subcampanulate heads.

I am looking upon \times *S. hirtipes* as probably derived from *S. microcephala* and *S. graminifolia*, var. *Nuttallii*, though further experience may show it to be wholly separable from them. The type-colony is likely to spread; as it is, we took only selected small plants of it.

XANTHIUM Chasei, sp. nov. (TAB. 1013, FIG. 1, et 1014). Planta a *X. strumario* differt petiolis scabro-hispidis foliorum laminis crassis supra scabris; fructi corpore glabro vel minute puncticulato lucido olivaceo ellipsoideo-ovoideo vel subgloboso 1.3-1.6 cm. longo 6-9 mm. crasso, rostris basin versus crassis glanduloso-puberulisque porrectis vel suberectis remotis rectis 4-5 mm. longis vel ad apicem exigue excurvatis vel incurvatis, exteriore facie 100-200 aculeis approximatis armato, aculeis anguste subulatis rectis vel superne curvatis glabriusculis vel basin versus glandulosis 2-3.5 mm. longis.—ILLINOIS: bottomlands of Illinois River near Peoria, Oct. 1, 1919, *Virginus H. Chase*, no. 3398, as *X. globosum* Shull (Herb. Chase., Herb. Gray.); Sept. 12, 1920, *Chase*, no. 3474, as *X. globosum* (Herb. Chase., Herb. Gray.); Sept. 15, 1945, *Chase*, no. 8205 (TYPE in Herb. Gray.; ISOTYPE in Herb. Chase.).

Although originally identified as *Xanthium globosum*, a natural identification since there was then no good material readily available of Shull's species, *X. Chasei*, named for its discoverer, VIRGINIUS HEBER CHASE, differs at once from that species (our PL. 1015, FIGS. 1 and 2) in several characters which appear in all the specimens before me. In *X. globosum* the leaves are thinnish to membranaceous and the ripe bur is light brown, with the body only 0.9-1.1 cm. long and 4.5-7 mm. thick, while the 50-80 prickles visible on one face are remote and 4-6 mm. long. This species is widespread from Illinois and Kentucky to Kansas and is represented in Mr. Chase's series by fine specimens from the bottomlands near East Peoria, his nos. 8206 and 8207. *X.*

Chasei differs in its thick and more scabrous foliage and especially in its burs. These are olivaceous or greenish brown, the body 1.3–1.6 cm. long and 6–9 mm. thick, with 100–200 prickles visible on one face, these rather crowded and only 2–3.5 mm. long. So far as the abundant material shows, the fruit of *X. Chasei* scarcely overlaps in any point the distinctive characters of *X. globosum*.

In its very short prickles *Xanthium Chasei* might suggest the European *X. strumarium* L. (our PL. 1013, FIGS. 2 and 3), a species with us only casually adventive¹ but apparently not naturalized near the port of Boston; but the two differ in many points and the natural habitat of *X. Chasei* is not ballast and rubbish about eastern seaports. In *X. strumarium* the petioles are minutely soft-pilose and the leaf-blades submembranaceous and barely scabridulous above; whereas the petioles of *X. Chasei* (on bottomlands where many plants tend toward glabrescence and thin leaves) are harshly scabrous, as is the upper surface of the thick leaf-blade. In *X. strumarium* the mature burs are closely and finely pilose, with the body only 5–7 mm. thick, the beaks only 1–2 mm. long, while the 15–50 slender prickles visible on each face have broad interspaces separating their bases. In *X. Chasei*, on the other hand, the mature burs are 6–9 mm. thick, glabrous (except for glandular punctation), the beaks 4–5 mm. long, the 100–200 bulbous-based prickles visible on one face crowded.

There is no chance that *Xanthium Chasei* has anything to do with the large-fruited series with strongly villous burs: *X. italicum* Moretti with fulvous burs villous-hirsute, the body 1.3–1.8 cm. long and 6–8 mm. thick, the subulate basally long-hirsute beaks 5–7 mm. long, the divergently long-villous prickles mostly 4–7 mm. long (see PL. 1015, FIGS. 3 and 4); *X. oviforme* Wallr. with

¹In the Gray Herbarium there are 3 sheets of *Xanthium strumarium* from the United States: (1) a fragment of doubtful origin in a series of plants said to have been collected by the late Stephen P. Sharples in Chester County, Pennsylvania, from 1858–1864; (2) branches from a single tall plant, found by the writer on October 20, 1912 (with fresh anthers), in rubbish back of Crescent Beach, Revere, Massachusetts; (3) portion of a single individual found on October 1, 1927, by S. F. Blake (*Blake*, no. 10,549) on a sandy beach at Hull, Massachusetts. In early November, 1945, Dr. Bernice G. Schubert and I followed the beach from south of Crescent Beach to well north of that area but no *Xanthium strumarium* could be found. Similarly, the sandy and gravelly beaches in Hull, like those in Revere, yielded only *X. echinatum*, *italicum* and *chinense*.

the body of the fulvous bur 2–2.5 cm. long and 1.2–2 cm. thick, the stoutish beaks 7–10 mm. long, and the densely crowded prickles 7–10 mm. long; and other species. Nor can it be forced into the very definite *X. inflexum* Mackenzie & Bush (our PL. 1015, FIGS. 5 and 6), which occurs on bottomlands and prairie of Illinois, Missouri, Kansas and Arkansas, for *X. inflexum* has the glabrous to hirtellous body of the bur 1.3–2 cm. long and 6–8 mm. thick, the strongly inflexed to overlapping or crossing beaks 5–7 mm. long, and the prickles 4.5–10 mm. long.

The glabrous or glabrescent burs of *Xanthium Chasei* might, to some minds, mean that it is *X. chinense* Mill. or *X. curvescens* Millspaugh & Sherff. The widely dispersed *X. chinense* (our PL. 1015, FIGS. 7 and 8), however, has the fewer reddish-tinged prickles very remote at base and 4–7 mm. long, the more inflexed or hamate beaks up to 7 mm. long. As to *X. curvescens* (our PL. 1016, FIGS. 1–4), described from the shores of Lake Champlain, that doubtful species, illustrated with the original description in Field, Mus. Pub., Bot. Ser. iv., no. 2, pl. xi, the burs shown in pl. viii, figs. 28–29 (1919), has the body of the fruit only 3.5–5 mm. thick, with only 30–50 stout and upwardly curving prickles visible on each face. It thus has characters strongly suggestive of the Old World *X. orientale* L. (PL. 1017). In fact, very typical *X. orientale* (our PL. 1017, FIGS. 5–8) is an abundant weed about Montreal, thence up the Richelieu Valley to the shores of Lake Champlain (perhaps better stated in reverse order), and the most slender Old World fruits (our FIG. 3) closely match those of *X. curvescens* (PL. 1016, FIGS. 1–4) and even of *X. leptocarpum* Millspaugh & Sherff. (our PL. 1016, FIGS. 5 and 6). In fact, when they published *X. curvescens* and *X. leptocarpum* the authors of those names saw their resemblance to *X. orientale*, saying

Because of its strongly bent prickles and beaks, we were disposed at first to regard this species as a form of the European *X. orientale* L. But in the many fruiting specimens of *X. orientale* examined from Europe, we have found the fruiting involucre to be not only considerably larger, but brownish rather than reddish, also much more pubescent and the prickles nearly always more numerous. In its narrow, reddish, remotely aculeate fruits, this species suggests the next, *X. leptocarpum*, the type of which was collected likewise in western Vermont, about three years earlier. Indeed, as a species, it seems to lie just half-way between *X. orientale* and *X. leptocarpum*, and for a time we suspected it of being a hybrid between these two species. But the apparent absence of true *X. orientale* from all of North America would seem to make an assumption to this

effect purely gratuitous. Nor do we feel inclined to regard our plant as an anomalous race or variety of *X. leptocarpum*, since the arcuate character of its prickles is a character that holds with a high degree of uniformity throughout the specimens of the corresponding *X. orientale* of Europe.

Had they realized the establishment of *X. orientale* from the shores of Lake Champlain to the streets, waste lots and wharves of Montreal, their first impression might have prevailed. At any rate, *X. Chasei* has nothing to do with *X. orientale*, and the doubtfully separable *X. curvescens* and *X. leptocarpum*.

If only its short beaks and prickles were taken into account and all other characters ignored or overlooked (a tendency too apparent in some recent so-called studies of *Xanthium*), *Xanthium Chasei* might superficially be placed with *X. echinatum* Murr. and *X. varians* Greene, for in all three of these species the beaks are unusually short and stout and the prickles short. There, however, the resemblance ends. Both *X. echinatum* (our PL. 1018) and *X. varians* (PL. 1019) have the olive-shaped drab to pale brown mature bur densely long-hirsute, the stout beaks 3–6 mm. long and with very stout hispid bases 2–3 mm. thick, the remote prickles mostly hamate, hirsute-villous below the middle and 3.5–5 mm. long. By recent authors the inland *X. varians* has not been distinguished from the coastal *X. echinatum*; but the two are well distinguished both by characters of leaf and bur and by their strikingly different habitats, *X. echinatum* confined to sea-beaches, dune-hollows and borders of saline marshes along the coast from southern Maine to Virginia; *X. varians* occurring inland, on shores and damp prairie, from western Quebec to northern Alberta, south to northern New York (St. Lawrence drainage), Iowa, South Dakota, Saskatchewan and Oregon. In the halophytic *X. echinatum* the young stem is whitened above with harsh and short hispidity, the later full-grown leaves are broadly cordate or subcordate-ovate, unlobed or very shallowly lobed, with undulations mostly longer than deep (FIGS. 1 and 2), and the beaks of the fruit (FIGS. 3–6) tend soon to inflex and finally to become approximate or with their tips crossing, like the bill of a crossbill. The inland *X. varians* (PL. 1019), on the other hand, has the greener stem with sparse pubescence, the larger leaves more often rhombic or cuneate-based, their margins subacutely dentate with teeth nearly or quite as high as broad,

and the erect or nearly erect beaks straight or nearly so (FIGS. 2 and 3). Only by the most superficial treatment could *X. Chasei* be crowded into either of these apparently different species or geographic varieties for its bur is essentially glabrous and lustrous, olivaceous, and with crowded nearly glabrous prickles only 2–3.5 mm. long.¹

I realize that in his somewhat novel (and we hope, immature) concept Cronquist, following the cue of Wiegand, who saw more hybrids than pure strains in several variable groups, has intimated in RHODORA, xlvii. 403 (1945) that most if not all our species of *Xanthium* are variations of one species, the European *X. strumarium*, for he finds that "The determination of species of *Xanthium* has become a formidable task, undertaken by many botanists only when it becomes unavoidable, and then with serious misgivings", exactly the situation with *Carex*, *Potamogeton*, *Festuca* and many other groups with inconspicuous flowers, which are regularly dodged by those who want to work only on pretty flowers. Nevertheless, there are scores of very real species in these genera and they have been clearly recognized by some of the most thorough and wise students of plants, for we bow with profound respect to such sound students of *Carex*, for example, as Willdenow, Schkuhr, Schweinitz, Torrey, Dewey, Francis Boott, William Boott, Tuckerman and many others, although the casual botanizer lets the genus alone. Similarly, that the study of *Xanthium* bristles with difficulties none will gainsay; but, paradoxically, the harder the points in this genus the easier

¹ It seems hardly necessary, in orienting *Xanthium Chasei*, to illustrate three species found in the eastern United States, with which it could not be confused. The bur of *X. pennsylvanicum* Wallr. is very similar to that of *X. chinense* but, whereas the body of the latter is glabrous or merely glandular-punctate and lustrous, that of *X. pennsylvanicum* is short-pilose with pale pubescence, and the 200 or more prickles visible on one face are mostly glandular-hispid below the middle, the bases of the prickles about as broad as the interspaces. In *X. chinense* the interspaces are broader than the nearly or quite smooth bases of the fewer prickles (100–150 visible on one face). *X. pennsylvanicum* thus stands between *X. chinense* and *X. italicum*. *X. speciosum* Kearney has a bur (including beaks and prickles) 3–4 cm. long and 2–3 cm. thick, the almost filiform-setose prickles 7–9 mm. long and so crowded as to have their bases practically hidden, the beaks 6–11 mm. long. *X. Wootoni* Cockerell could be confused only with *X. orientale*, but it differs in its fewer heavily glandular and straightish prickles and in having the porrect (instead of strongly incurving) beaks more distant from the upper prickles. The burs of all four of the species are beautifully illustrated by Millspaugh & Sherff or by Widder.

the identifications, for, whereas young and relatively tender flowering plants and even those with well-grown but immature fruit are most difficult to distinguish (being annuals of very similar habit and foliage), the fully mature and very hard burs alone are sufficient for identification. The somewhat discouraged verdict of Wiegand, which Cronquist accepts in lieu of working out the characters, is not final: "It is probably wise to treat all North American *Xanthiums* as one species except *X. spinosum* L. and possibly *X. strumarium* L. and *X. echinatum* Murr. *X. strumarium*, however, is scarcely distinct, and with more study may also be included. *X. echinatum* may be a real species, as it has a distinct coastal range and seems to behave as though genetically distinct". Cronquist is "in complete agreement with Wiegand's observations, except that *X. strumarium* sens. strict., seems no more than varietally distinct from our plants, and that I am quite unable to see any sort of taxonomic unit in *X. echinatum*."

Inability to see what others clearly see is not a sin; neither does it necessarily clarify a question. To those who have some understanding of the characters in the genus, Wiegand's recognition of *X. echinatum* will appeal. Several close students have devoted themselves to the difficult and often thankless task of working out the characters of *Xanthium*: (1) Wallroth, *Monographischer Versuch über die Gewächs-Gattung Xanthium*, Wallr. Beitr. i. 219–244 (1844), Wallroth recognizing 21 species, 7 of them North American;¹ (2) Millspaugh & Sherff, *Revision of the North American Species of Xanthium*, Field Mus. Pub., Bot. Ser. iv. no. 2 (1918), with very fine illustrations of the burs, this very detailed study also recognizing 21 species but all of them found in North America, the authors having gone to great pains to identify the types of earlier-described species; (3) Widder, *Die Arten der Gattung Xanthium* in Fedde, Repert. Beih. xx. (1923), a very conservative and careful study with clear illustrations of the fruits, the original text completed before the publication of the monograph of Millspaugh & Sherff, but that study summarized in the Nachtrag. Widder maintained most of the species

¹ That Wallroth was not a visionary, as one might infer from those who can see nothing in his species of *Xanthium*, is apparent from his great monograph of *Agri-*monia**, published also in his *Beiträge*, for his four new North American species, *A. gryposepala*, *rostellata*, *microcarpa* and *pubescens*, are all maintained by those who have closely studied the genus.

recognized by Wallroth and by Millspaugh & Sherff. If, as we have recently been told, all of them, except *X. spinosum*, are modifications of a single species, which in its typical form has scarcely gained a foothold (and that near a large Atlantic port) in America, it is amazing that not one of the really careful students of the genus should have suspected the species to be of such instability.

Besides the three great monographs of *Xanthium*, there have been many significant but briefer studies, these noted by Millspaugh & Sherff and by Widder. From our viewpoint as significant as any is that of the physiologist, Professor Charles A. Shull, *Physiological Isolation of Types in the Genus Xanthium*, in Bot. Gaz. lix.¹ 474-483, with 7 blocks of figs. (1915). Desiring material for physiological study, Shull went to an old field near Lawrence, Kansas, where plants of *Xanthium* with 3 quite different types of bur abounded. "It was thought that the various forms were possibly the result of promiscuous crossing of varieties or elementary species, and that a year or two of guarded pollination would be necessary to purify the strains." Shull took essentially uniform burs from a single plant each of the three extremes, what he eventually described as a true species, his *X. globosum*, the wide-ranging *X. pensylvanicum* and *X. canadense* (now known by the earlier name *X. chinense*). Successive generations from these fruits in carefully checked plots proceeded to come true and not to show any Mendelian segregation. "This result was wholly unexpected, as it was believed that hybridization could hardly have been avoided in nature". Shull recognized not only the differences in burs but those of cotyledons even, as well as of pigmentation of the stems and prickles and shape of the seeds and color of their coats; and, having started out a skeptic, with the popular preconception that the differences of burs and other characters he saw were the result of "promiscuous crossing", he frankly concluded his experimental study by defining a new species, and on his last page he unblushingly predicted that "There are probably a number of new species of *Xanthium* still undescribed in America". *X. Chasei* is one of them.

¹ Through the perverse fatality which dogs editorial movements the signature of the Gazette on which Shull's paper begins bears the note "**Botanical Gazette, vol. 69]**"

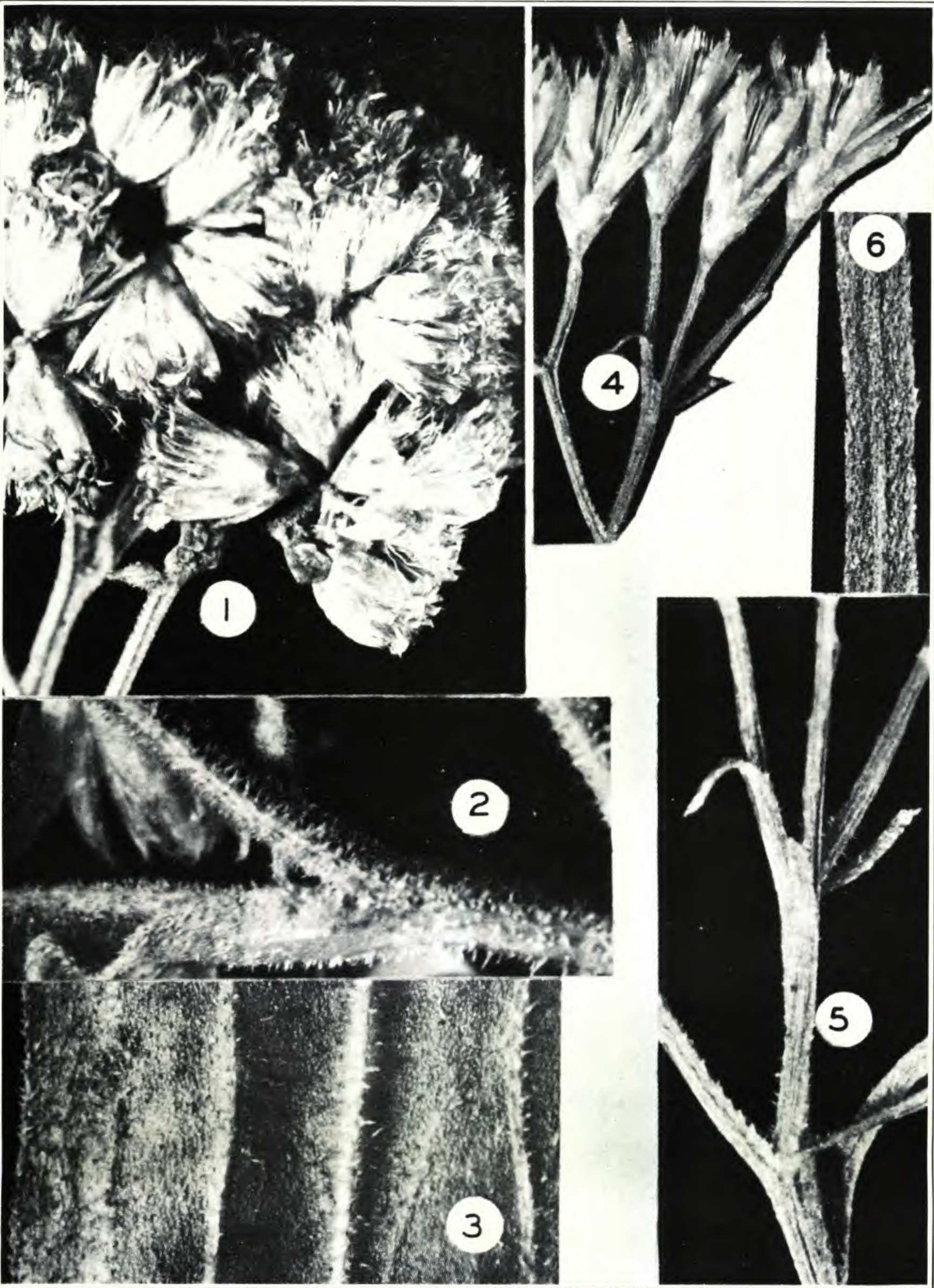


Photo B. G. Schubert

SOLIDAGO GRAMINIFOLIA, var. NUTTALLII: FIG. 1, glomerules, $\times 5$; FIG. 2, branchlet and pedicel, $\times 10$; FIG. 3, lower surface of leaf, $\times 10$.
S. MICROCEPHALA from TYPE-REGION: FIG. 4, pedicelled heads, $\times 5$; FIG. 5, branchlet and pedicels, $\times 10$; FIG. 6, upper surface of leaf, $\times 10$.

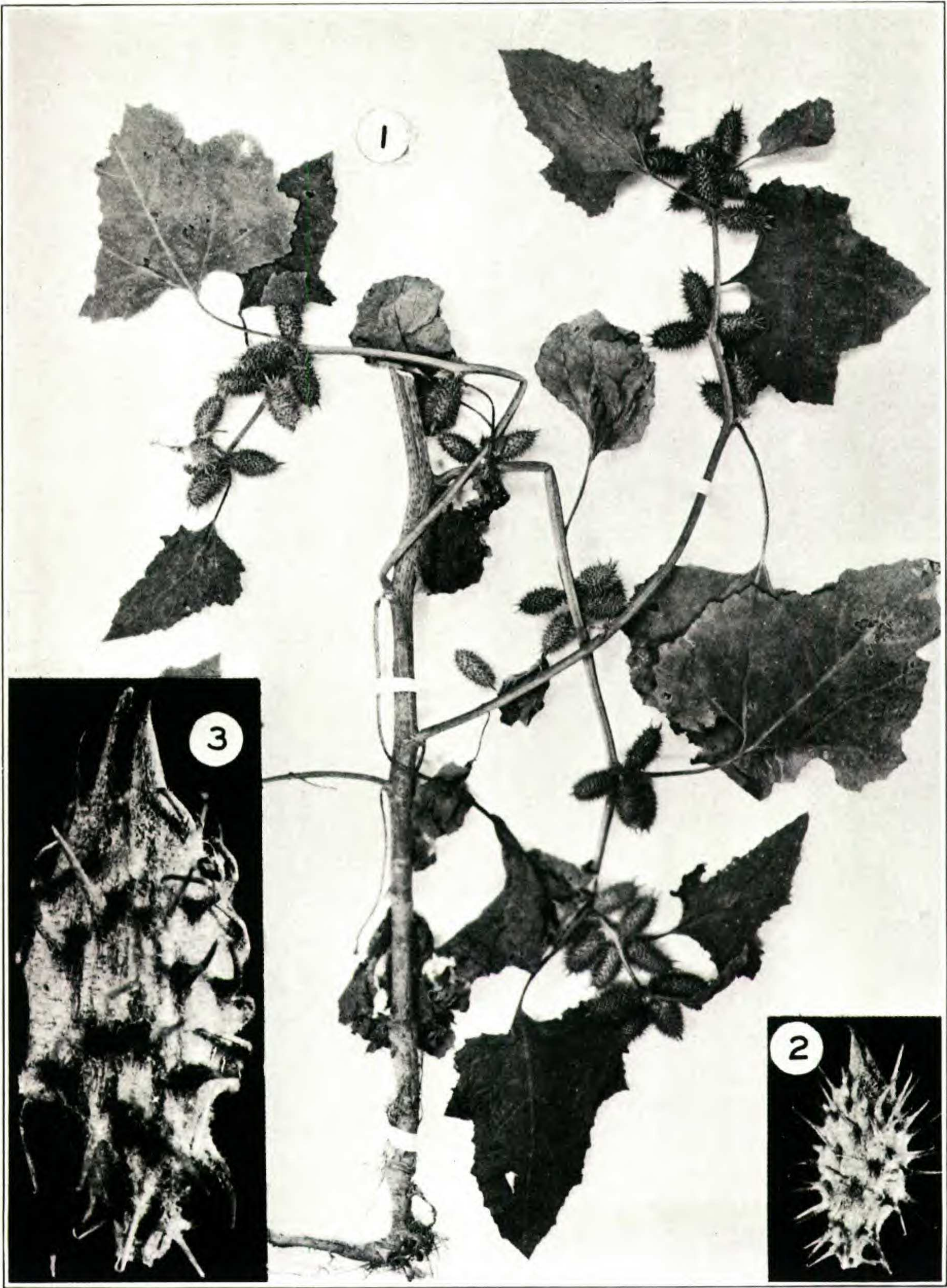


Photo B. G. Schubert

XANTHIUM CHASEI: FIG. 1, TYPE, $\times \frac{3}{7}$.
X. STRUMARIUM: FIG. 2, bur, $\times 2$; FIG. 3, bur, $\times 5$.

On the Illinois bottomlands near Peoria *Xanthium Chasei* has remained constant, just as *X. echinatum* does along the coastal sands or as does the distinctive *X. speciosum* Kearney, brought unintentionally in western fleeces to New England woolen-mills, whence it has washed down-river and made constant and consistent colonies far from their native haunts.

Cronquist's last paragraph on *Xanthium* reads:

Although both species [all-inclusive *X. strumarium*, involving all American members of DeCandolle's § *Euxanthium*, and *X. spinosum*, the single species recognized by him in § *Acanthoxanthium* DC.] of *Xanthium* have now become cosmopolitan weeds, and *X. strumarium* was well established in Europe four hundred years ago . . . , it seems probable that they originated in the new world. Except for a few species of *Ambrosia*, the subtribe *Ambrosinae* is otherwise exclusively American.

That statement implies that the several endemics in *Xanthium* § *Euxanthium* which are known only in the Old World, such unique plants as *X. inaequilaterum* of DeCandolle (who was no "splitter"), found from Java and Borneo to Japan and the coast of southeastern China, or as *X. indicum* König (*X. Roxburghii* Wallr.) of tropical and subtropical India, Sumatra and Java,—the implication is that such endemic species of the Old World originated in America, but entirely quit the New World in favor of the Old. This interpretation is again illustrated by *X. spinosum*, often assumed to be indigenous (as perhaps it is) in South America, but certainly not in eastern North America, where it is a weed of relatively recent introduction. Linnaeus described it "*Habitat in Lusitania*" and Widder, whose citations of South American and North American specimens occupy less than 1 page, gives up 6 pages to citations of European and African specimens. Whether this semicosmopolitan weed is native in South America I cannot say, but the learned Charles Pickering wrote in his *Chronological History of Plants*, 976 (1879): "Transported to North America as late perhaps as 1814 (as may be inferred from the silence of Walter, Michaux, and Pursh), was found by Nuttall in 1818 near dwellings from Savannah to Washington, and not foreseeing that it would become troublesome, was introduced by him as he informed me into the environs of Philadelphia; . . . In the Southern Hemisphere, by European colonists also, was probably carried across the Andes into Chili (Beechey voy. 57, and A. Dec.)", Hooker & Arnott,

in their Botany of Captain Beechy's Voyage, recording it from Valparaiso, surely not an undisturbed locality. Finally, in regard to the nativity of *X. spinosum*, the article, *Xanthium spinosum in Neolithic deposits in Bulgaria*, by W. B. Turrill in Kew Bull. for 1923: 190 (1923) is significant:

Xanthium spinosum is one of the commonest ruderal plants of Central Europe and the Mediterranean region. It has generally been considered by recent writers to be a native of South America. The strong arguments in favour of this view will be found summarized by Thellung in his Flore adventice de Montpellier Another opinion, which was current among earlier botanists, that *Xanthium spinosum* was native in South Russia, was rejected by Ascherson It may also be noted that according to L. Simonkai and Karl Flatt . . . both A. Florentin and also C. Spegazzini have collected fossil fruits ('false-fruits') of *X. spinosum* from the Pliocene beds in the Tertiary formation of the Pampas.

"During a visit to Bulgaria last summer Dr. N. Stoianoff of Sofia University gave me some semi-fossilized fruits which careful comparison at Kew has shown to be those of *Xanthium spinosum*. These were obtained during excavations in prehistoric deposits . . . east of Sofia, . . . The deposits are of Neolithic age . . .

"Whatever may be the real history of *Xanthium spinosum* in the Old World this discovery would seem to indicate that the species existed in South Europe long before the dates (1700-1750) accepted by Thellung for its first introduction and establishment.

Surely Neolithic Bulgarians did not come to America to get it. *Xanthium*, like *Ambrosia*, obviously has species native to the Old World as well as to the New. Wallroth thought that he saw characters to separate American material from typical European *X. spinosum*. And, although Cronquist would reduce all *Xanthium* to the two species (*i. e.* the two sections of DeCandolle and others), the European *X. strumarium* L. and *X. spinosum* L., it is most difficult to believe that the very distinct and characteristic *X. ambrosioides* Hooker & Arnott, the Argentinian procumbent plant with bipinnate blunt-lobed leaves, a species which has to be taken into account by those who watch the waste lots of New England, can possibly be forced into *X. spinosum*. Hooker & Arnott were ultraconservative, yet they saw what is a really good species in *X. ambrosioides*; so did Widder; so do others.

HELIANTHUS ATRORUBENS L., var. **alsodes**, var. nov. (TAB. 1020), foliis imis longe petiolatis anguste ovatis vel late lanceolatis acutis vel subacutis plerumque serratis vel serrato-dentatis; foliis supernis anguste ovatis vel lanceolatis.—Dry open woods, thickets and clearings, Virginia, North Carolina and upland of southeastern Kentucky and eastern Tennessee. VIRGINIA: dry

land about 3 miles north of Williamsburg, James City Co., *R. W. Menzel*, no. 289; dry open thickets, Virginia Beach, Princess Anne Co., Sept. 10, 1935, *Fernald, Long & Fogg*, no. 5127 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); rich woods and bushy clearing north of Double Bridge, southwest of Jarratt, Sussex Co., *Fernald & Long*, no. 11,474; Bedford Co., Oct. 15, 1871, "leafy-stemmed form", *A. H. Curtiss*; "Mts., Carol. & Virginia", *Asa Gray*. NORTH CAROLINA: sand-ridge at Atlantic, Cartaret Co., *Godfrey*, no. 6447; pineland near Goldsboro, Wayne Co., *Godfrey*, no. 6576; sand-ridge near Roseboro, Sampson Co., *Godfrey*, no. 5699; sand-ridge at Carolina Beach, New Hanover Co., *Godfrey*, no. 6368; pine woodland, Raleigh, *Godfrey*, no. 6601; thicket, Raleigh, *Godfrey*, no. 6892; dry thicket, north of Spruce Pine, Mitchell Co., *Wiegand & Manning*, no. 3378; dry open woods, Biltmore, Buncombe Co., *Bilt. Herb.*, no. 499^a; rich wooded mountain side near Asheville, *A. H. Curtiss*, no. 6526; open woods, Henderson Co., Aug. 24, 1881, *J. D. Smith* (as *Rudbeckia fulgida*); open woodlands, Highlands, *Bilt. Herb.*, no. 499^c. KENTUCKY: roadsides and fields east of Cumberland Falls, Whitley Co., *McFarland*, no. 59. TENNESSEE: gravelly oak-pine woods, Jamestown, Fentress Co., *Svenson*, no. 4100.

Helianthus atrorubens consists of the two rather marked varieties: var. *normalis* Kuntze, Rev. Gen. i. 343 (1891), and the narrower-leaved plant here described as var. *alsodes*. The species started with the detailed description and life-size plate of *Corona solis minor, disco atro-rubente* of Dillenius, Hort. Elth. 111, t. xciv (1732) and the *Helianthus foliis ovatis crenatis* of Gronovius, both cited without further description by Linnaeus, who obviously took his epithet from Dillenius (whose plant was from Carolina) but gave the "Habitat in Virginia". There was no specimen of the species in the Linnean Herbarium at the time of writing *Species Plantarum*; and the Gronovian description of the Clayton specimen, with "folia asperata paucis auritis, ex adverso binis auriculatis", suggests the Dillenian plate, in which there are tiny leaves ("auricles") at the bases of some large primary leaves. Such tiny undeveloped axillary branchlets occasionally occur in the plant with ovate or oval bluntish leaves (var. *normalis*) but I have not seen them in var. *alsodes*. The Dillenian plate (which may stand as TYPE of the species) is of the characteristic plant found from Florida to Louisiana, north to Virginia and Tennessee, with the basal leaves ovate or oval and crenate to dentate, these and the lower cauline with blades one half to four

fifths as broad as long and blunt or merely subacute, their bases abruptly contracted to the winged petiole, the sessile or subsessile median cauline leaves ovate or oval. In this plant the middle phyllaries are broadly rounded at summit or abruptly short-acuminate.¹ Var. *alsodes*, although found in the northeastern third of the specific range, has the lower long-petioled leaves usually more gradually tapering from petiole to blade, and the most often serrate or serrate-dentate blade is acute or acutish, two to five times as long as broad; the lowest sessile cauline blades lanceolate or narrowly ovate. In var. *alsodes* the middle phyllaries (FIG. 3) are usually less broadly rounded at summit.

It is barely possible that *Helianthus atrorubens*, var. *alsodes* is the plant described as *H. sparsifolius* Ell. Sk. ii. 415 (1823) from the "western districts of Georgia", as contrasted with his *H. atrorubens* apparently common in his own region of southeastern South Carolina. Elliott's "leaves ovate, acute, coarsely toothed" is good, but "abruptly contracted into a petiole" not so good; furthermore, since he defined *H. atrorubens* as having "leaves spathulate", it would be unwise, his specimens of *H. sparsifolius* not being preserved at Charleston, to take up the name for var. *alsodes*. From the citation by E. E. Watson in Papers Mich. Acad. ix. 343 (1920), in the synonymy of *H. atrorubens*, of *H. gracilis* Bertoloni one might infer that Bertoloni had our plant. It is noteworthy, however, that Watson omitted the citation of Bertoloni's plate, which he evidently had not seen. *H. gracilis* Bertoloni, Misc. Bot. vii. 41, t. vi, fig. 1 (1868), shown life-size, is a monocephalous plant with lower entire leaves barely petioled, extending gradually as linear-lanceolate blades to the single peduncular summit of the stem, the phyllaries linear or lanceolate

¹ The following are characteristic specimens of var. *NORMALIS*. VIRGINIA: west of Mt. Hope Church, Southampton Co., *Fernald & Long*, no. 11,472; northwest of Round Gut, southwest of Franklin, Southampton Co., *F. & L.*, no. 11,473. NORTH CAROLINA: west of Jacksonville, Onslow Co., *Godfrey*, no. 6461; Winston-Salem, Forsyth Co., *Godfrey*, no. 6103; Biltmore, Buncombe Co., *Bilt. Herb.*, no. 499^a; South of Tuxedo, Henderson Co., *Wiegand & Manning*, no. 3377; Highlands, Aug. 2, 1902, *Magee*; Joy, Burke Co., *Hunnewell*, no. 12,981. SOUTH CAROLINA: Eutawville, *Eggleston*, no. 4997; Marietta, Greenville Co., *Wiegand & Manning*, no. 3376. GEORGIA: Middle Ga., 1846, *Porter*. TENNESSEE: Chilhowee Mt., *A. H. Curtiss*, no. 1439. LOUISIANA: without stated locality, *Drummond*.

It is not improbable that var. *normalis* tends to grow in damper soil than var. *alsodes*. Of the 16 sheets before me of var. *alsodes*, of which *habitat* is given, all are from dry situations. Of the 13 of var. *normalis* with *habitat* noted 2 are from savannas, 1 from pine-barren bog.

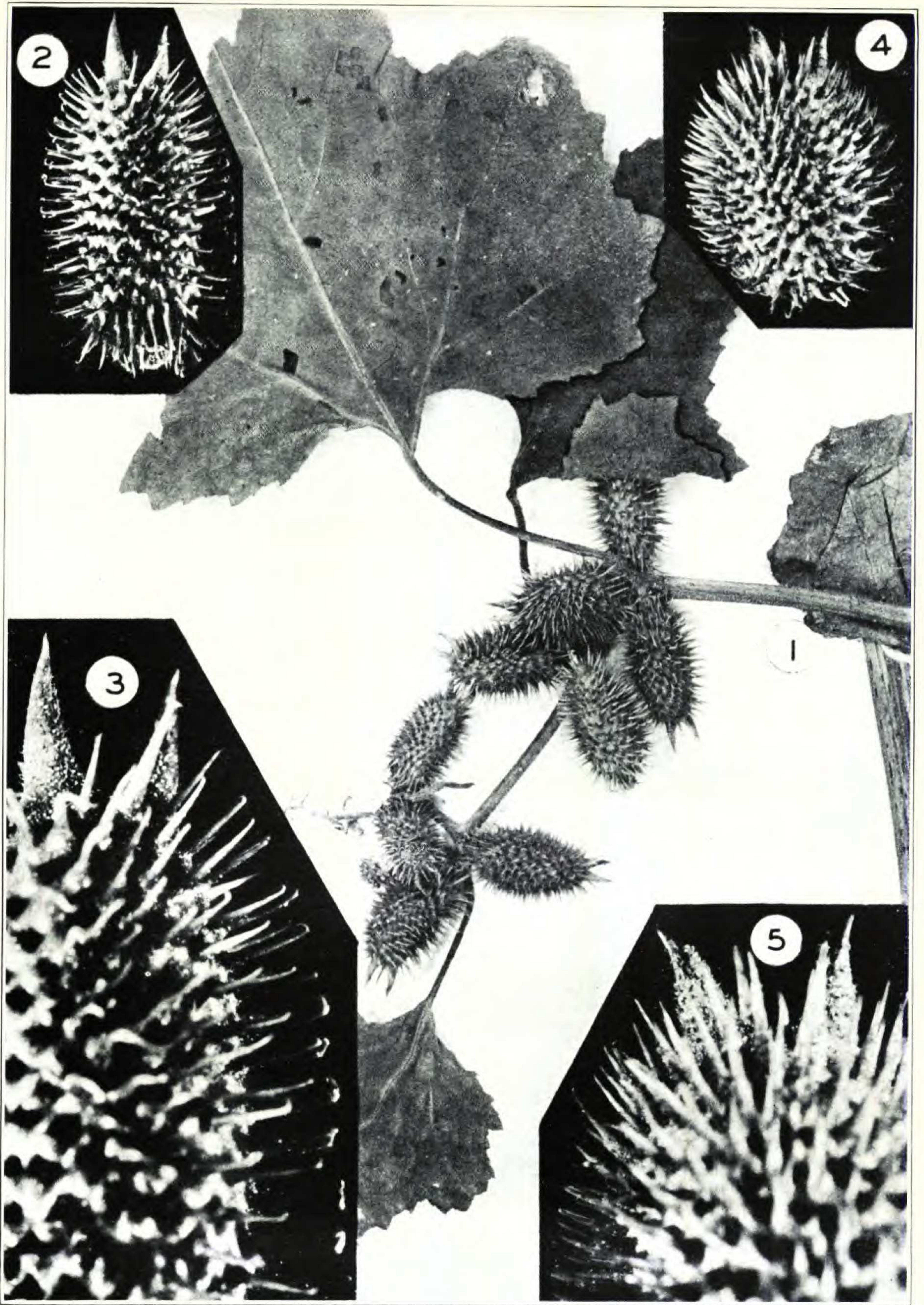


Photo B. G. Schubert

XANTHIUM CHASEI, FIGS. 1, 2 and 3 from TYPE: FIG. 1, portion of plant, $\times 1$; FIG. 2, bur, $\times 2$; FIG. 3, portion of bur to show beaks and bulbous-based prickles, $\times 5$; FIG. 4, bur, $\times 2$, and FIG. 5, its summit, $\times 5$.

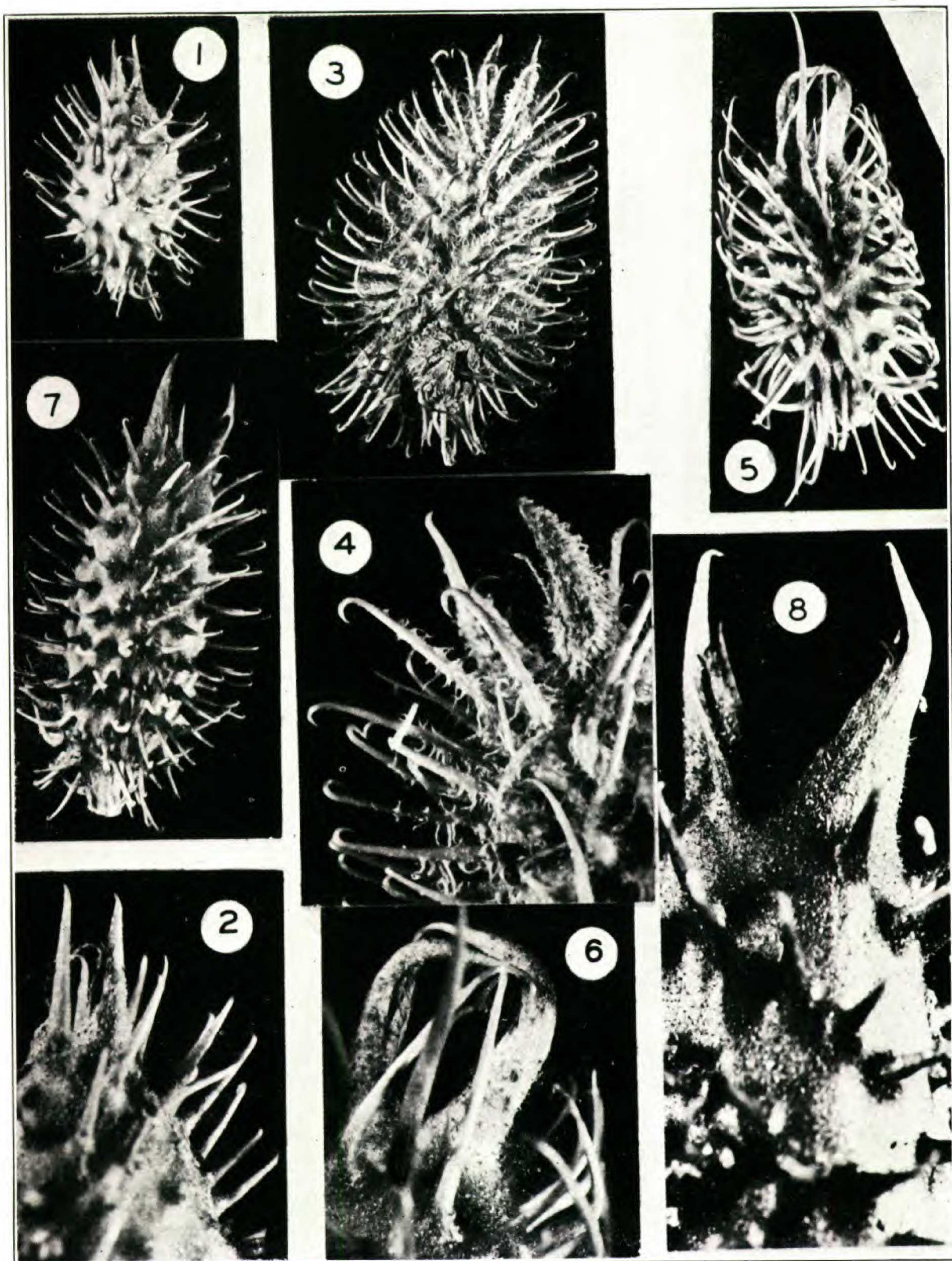


Photo B. G. Schubert

XANTHIUM, BURS, $\times 2$, BEAKS, $\times 5$; FIGS. 1 and 2, *X. GLOBOSUM*, from plant raised from seed of TYPE; FIGS. 3 and 4, *X. ITALICUM*; FIGS. 5 and 6, *X. INFLEXUM*; FIGS. 7 and 8, *X. CHINENSE*.

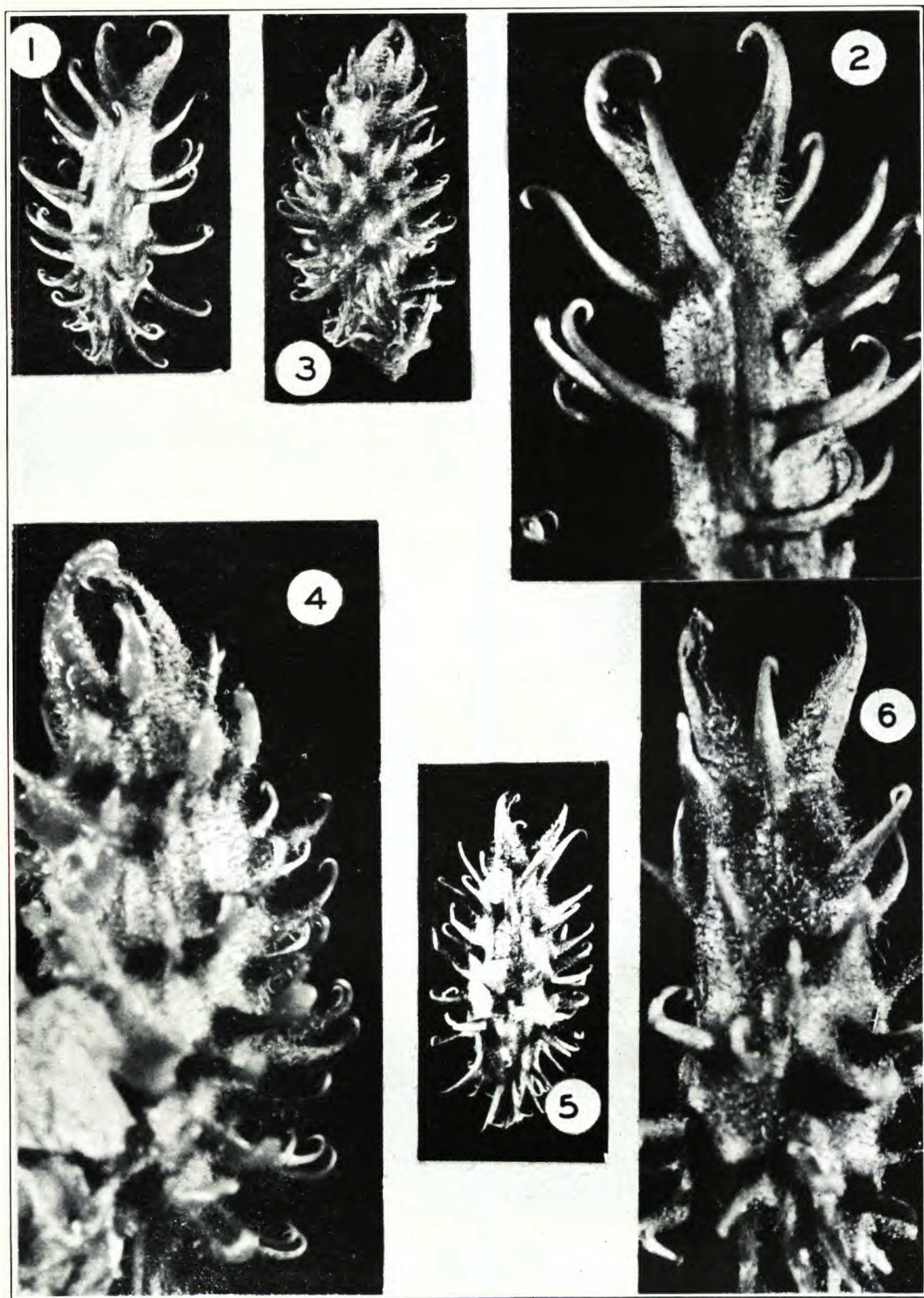


Photo B. G. Schubert

XANTHIUM, entire burs $\times 2$, enlargements $\times 5$: FIGS. 1-4, *X. CURVESCENS*, FIGS. 1 and 2 from TYPE; FIGS. 5 and 6 from TYPE of *X. LEPTOCARPUM*.